

# Earth and Environmental Sciences

## Chair

- David W. Peate

**Undergraduate major:** geoscience (BA, BS)

**Undergraduate minor:** geoscience

**Graduate degrees:** MS in geoscience; PhD in geoscience

**Faculty:** <https://ees.uiowa.edu/people>

**Website:** <https://ees.uiowa.edu/>

## Facilities

Resources and equipment available for research in the Department of Earth and Environmental Sciences include the following.

**Computer facilities:** three teaching classrooms with 10–12 networked PC workstations; a computing classroom with 20 PCs and 10 Mac workstations with GIS, GMS, remote sensing, image analysis, and specialized computational software packages; a student computer room with six PCs and two Macs; and a number of multiprocessor workstations in research laboratories.

**Electron microprobe:** JOEL JXA-8230 electron probe microanalyzer with five wavelength-dispersive spectrometers capable of quantitatively analyzing a full spectrum of elements in solid materials to a spot size as small as one micron.

**Environmental and Hydrogeology Laboratory:** permeameters and tensionometers; pumping and slug/bail test units with transducers and data-loggers; water-quality analysis facility; advanced groundwater modeling and geostatistics software; advanced data logging systems for field research; 3D sensor arrays (wind and water systems); and facilities for field instrumentation design and construction.

**Environmental instrumentation laboratories:** storage, testing, and teaching facility focusing on field instrumentation; assembly, housing, and testing of climatic, meteorological, fluvial, water quality and associated environmental instrumentation data recording systems and sampling systems.

**Geomorphic Computing Laboratory:** high-end visualization, digitizing, remote sensing, and GIS systems; and high-end multiprocessor workstations.

### Mineral Separation and Geochronology Preparation

**Facility:** jaw crushers, disk pulverizer, shaker table, electromagnetic separators, and heavy liquid separation equipment for mineral separation; core drill apparatus and saws for removing grains from thin sections and slabs; microscopes and digital imaging for grain selection and characterization; polishing equipment for slabs, thin section stubs, and grain mounts; natural standards for co-mounting with unknowns prior to analysis at a variety of geochronology facilities.

**Morphometric laboratories:** reflex microscope and microscribe for capturing 3D data; high-resolution digital

cameras and microscopes for 2D image analysis; and laboratories for micro- and macro-fossil preparation.

**Paleontological Repository:** more than a million specimens, including some 25,000 type and referred specimens, with 6,000–7,000 primary types; invertebrate, vertebrate, and plant fossils of all geologic ages, and more than 90% Paleozoic invertebrates; one of the largest university collections in North America.

**Petrology and geochemistry laboratories:** laser-ablation inductively coupled plasma mass spectrometer (LA-ICPMS); clean laboratory for preparation of samples for elemental and isotopic analysis; alpha- and gamma-spectrometry laboratories; image analysis; petrographic microscopes; photo microscopy; wet-chemistry facilities; rock preparation and mineral separation; UNIX, Windows, and Mac workstations for data analysis and modeling; and one atm gas-mixing furnace for melt inclusion homogenization.

**Quaternary Materials Laboratory:** pipette grain-size analysis apparatus; chittick apparatus; Sedigraph 5100 X-ray particle-size analyzer; Horiba Camsizer L digital image particle analyzer; wet-chemistry facilities; C-H-N element analyzer; a Flotech flotation system; and a Giddings drill rig.

**Scanning electron microscope:** Hitachi S-3400N, a variable-pressure scanning electron microscope (SEM) equipped with a motorized stage, large chamber, and digital image capture; capable of imaging specimens with no metal coating, or specimens that are slightly hydrated or porous, as well as conventionally processed specimens; equipped with a Bruker AXS Quantax 400 X-ray microanalysis system; XFlash silicon drift detector with excellent energy resolution and light element detection, providing ultra-fast acquisition of line scans and elemental maps; and a Gatan ChromaCL cathodoluminescence detector system for imaging grain textures.

**Sedimentary geology laboratories:** water ion chromatograph; image analysis; Sedigraph X-ray particle-size analyzer; Horiba Camsizer L digital image particle analyzer; and a soil/sediment characterization laboratory.

**Thin-Section and Rock Preparation Laboratory:** diamond saws and specialized grinding equipment used to prepare ultrathin slices (30 microns thick) of rocks and fossils for microscopic and electron microprobe analysis.